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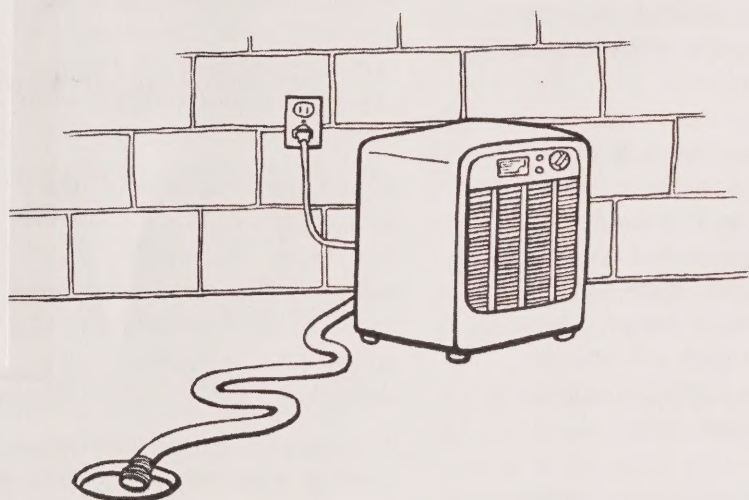
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BOUT YOUR HOUSE

CE 27

CHOOSING A DEHUMIDIFIER

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Moisture in house air can be a problem when there is either too little or too much. Air that is "too dry" can cause discomfort, dried and itchy skin and nasal passages, cracked or rickety furniture, and sparks when you reach for a doorknob or another person.

Air that is "too damp" can cause itchy skin and nasal passages, ongoing condensation on windows, water damage to materials, mold growth and even rot of wood materials in your house.

Note that both excessively dry and overly damp conditions can both lead to the same problem of dry and itchy skin and nasal passages. In the first case this is because the air is dry and in the second case because it contains mold debris and spores that are toxic.

You can adjust and control the relative humidity in your house. This About Your House suggests some ways of avoiding problems caused by air that is too damp and tells you how to select and use a dehumidifier.

What is relative humidity?

Relative humidity is a percentage. It tells you how much moisture is in the air relative to the maximum amount the air can hold at that temperature. For instance, when air at a given temperature contains all the water vapour it can hold at that temperature, the relative humidity is 100 per cent. If the humidity is higher than 100 per cent, moisture will begin to condense from the air. If the air contains only half the water it can hold at that temperature, the relative humidity is 50 per cent.

Warm air can hold more moisture than cool air. The relative humidity of a sample of air will change as the temperature changes, even though the actual amount of moisture in the sample air does not. For example, as a sample of air cools, the relative humidity rises.

What is the "right" moisture level?

Generally, the "right" moisture level—the relative humidity—in your house is less than 50 per cent. At less than 50 per cent relative humidity it is unlikely that mold will grow indoors.

There are cases when 50 per cent relative humidity is too high. For instance, if there is condensation on your windows in cold weather, it's a good idea to lower your relative humidity to as low as 30 per cent.

Another instance: if you, or someone in your family, is asthmatic, you should consider keeping the humidity level in the bedroom at 40 per cent or less.



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Dust mites prefer relative humidity of 50 per cent and higher. Dust mites leave debris in bedding, and the debris aggravates asthma. Keeping the relative humidity at 40 per cent or less controls the dust mites and reduces their effect on asthmatics.

Sometimes, reducing relative humidity won't solve moisture problems. Defects in insulation or the air barrier in walls and ceilings can cause cold spots in your house. They show up as areas where there is always condensation, even if relative humidity is 50 per cent or less. A dehumidifier won't solve the problem. You will need help from a qualified builder, renovator or insulation specialist.

Where does moisture in air come from?

Moisture can come into your home from many places. Outside sources include the soil around your house, surface water drainage and damp outdoor air. Breathing and perspiration by you, your family and your pets is a major source of indoor moisture. So are showering, bathing, drying clothes indoors, venting clothes dryers indoors, washing dishes and floors and humidifiers.

Most houses have more than one source of moisture. Moisture can cause problems once in a while, or all the time. A little prevention can keep excess moisture out of your home's air and prevent both occasional and continual problems.

Catastrophes—such as plumbing leaks or floods—can cause serious problems very quickly. You will need emergency repairs to deal with them.

Checking the moisture level in your house

A "hygrometer" measures relative humidity. A hygrometer is an inexpensive, easy-to-use instrument, sometimes called a humidity sensor or relative

humidity indicator. There are mechanical and electronic hygrometers. A mechanical hygrometer usually costs \$10 or less. Electronic hygrometers cost \$35 to \$60. *Measuring Humidity*, in the About Your House series, shows you how easy it is to calibrate and use a hygrometer. The order number is CE 1. There are ordering instructions at the end of this *About Your House*.

Stopping moisture

Preventing moisture from entering your house is the best way to solve moisture problems.

If you have surface leaks you can fix them by grading the soil around your house. You can fix groundwater leaks by repairing basement or crawl space walls and floors. At the end of this *About Your House* there is a list of Canada Mortgage and Housing Corporation (CMHC) publications about basement problems.

Easy preventive measures include shutting down humidifiers, drying clothes outdoors and venting the clothes dryer outside the house. One of the best ways to reduce moisture is to use a good quality, quiet bathroom fan. It vents moisture from showers and baths.

In hot, muggy weather, ventilate your house as little as possible. Air out your house when there's a dry spell and no chance of moisture problems. However, you can reduce relative humidity in dry, cold weather by increasing ventilation. A whole-house ventilation system, such as a heat recovery ventilator (HRV) or an exhaust fan coupled with fresh air intakes, will increase ventilation and dry out house air.

In the summer you can use an air conditioner that removes water from incoming air instead of just cooling it. Look for an air conditioner with a high "latent heat" rating rather than a good "sensible heat" rating.

In regions where there are months of cool, damp weather or hot, muggy weather, ventilation just adds more moisture to indoor air. A dehumidifier is an effective way of preventing moisture problems.

Dehumidifiers and how they work

Heat pump dehumidifiers

Dehumidifiers use a heat pump (similar to an air conditioner's heat pump) or chemical adsorbents to remove moisture from the air without cooling the air.

A heat pump dehumidifier uses a fan to draw indoor air over a heat exchange coil. The coil is almost freezing. The water in the air condenses on the coil and is drained. A second heat exchange coil reheats the air, which the dehumidifier exhausts into the room.

A heat pump dehumidifier dumps heat lost from the compressor and fan motors into the air. It returns to the indoor air the heat generated by the dehumidifier turning water vapour to liquid.

Chemical adsorbent dehumidifiers

This type of dehumidifier is designed for hot, humid climates and is not really suited for use in Canada.

Chemical adsorbent dehumidifiers absorb moisture from the air with a "desiccant"—a drying agent such as silica gel. The desiccant is on a heat exchange wheel. A separate air loop dries the wheel and exhausts the hot, damp air outdoors through special ducting.

A chemical adsorbent dehumidifier uses more energy than a heat pump dehumidifier. It is only cost-effective when it uses natural gas for heat exchange—and then only if natural gas is available at a low summer rate.

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Homemade dehumidifier

Some inventive people use bags of road de-icing salt to absorb moisture from the air. The wet salt solution drips into a pan or floor drain, drying the air. Because the salt runs off with the water removed from the air, it must be replaced. The system has no moving parts.

If you try this homemade dehumidifier, remember that salt is highly corrosive to metals and quite hard on the skin.

Dehumidifying ventilators

This type of dehumidifier has a sensor-controller and exhaust fan. You set the sensor-controller to run when humidity reaches a set level. A dehumidifying ventilator is particularly effective if the humidity source is in your basement.

Dehumidifying ventilators don't recover heat but they use less electricity than heat pump dehumidifiers. They are not effective in hot, muggy weather, as they bring more outside air into the house. They can be effective in cold weather.

A dehumidifying ventilator depressurizes your basement, which can cause combustion gas spillage. Make sure your heating contractor checks the venting for your gas furnace, water heater and wood-burning appliances. Consider using a carbon monoxide warning device if you install a dehumidifying ventilator.

Dehumidifier purchase costs

Heat pump dehumidifiers are complex, low-production machines and are not low-cost items. Spring seems to be the best time to buy: in the last few years dealers have held sales early in the spring with savings of \$50 to \$100.

The more water a dehumidifier holds—which is measured in litres or U.S. pints a day—the more it costs. You pay more for special features.

In 2000, you can expect to pay between \$200 and \$250 for a unit rated at 10 L (21 U.S. pints or 2.1 imperial gal.) a day—suitable for a small house with a moderate moisture problem. The price rises to between \$250 and \$350 for a unit with a capacity of 20 L (42 U.S. pints or 4.3 imperial gal.) a day—suitable for a large house with more severe problems.

Running costs for both units are about the same if they both have the same Efficiency Factor. The next section explains the Efficiency Factor.

Don't try to save money by buying a unit that does not have automatic defrost. If a room is too cool, a dehumidifier can frost over and stop removing moisture. A frosted-over dehumidifier left running for a long time will break down.

Get a unit with a two-speed fan. They are quieter at lower humidity, which reduces the nuisance factor. Test all units in the store for noise level, especially if you plan to use one in or near a bedroom.

The Efficiency Factor

The Efficiency Factor (EF) is a guide to a dehumidifier's operating cost. The product brochure or operator's manual usually give the EF. If they don't, you'll find the EF on a label behind the water collection bucket.

The EF is the amount of water, in litres, a dehumidifier removes at 27°C (80.6°F) and 60 per cent relative humidity for each kilowatt hour (kWh) of electricity. If electricity costs 8 cents a kilowatt hour, which it does in many parts of Canada, a unit with an EF of 1.2 will remove 15 L (32 U.S. pints or 3.3 imperial gal.) for each dollar in electricity costs. An advanced unit with an EF of 2.4 will remove 30 L (63 U.S. pints, 6 1/2 imperial gal.) of water for each electrical dollar spent.

Because condensation gives off heat a dehumidifier acts as a heat source. This can be useful in spring or fall, when basements tend to be cool. In mid-summer, the heat added by a dehumidifier is counterproductive.

Total cost

Total cost includes the purchase price, operating and maintenance costs and repair costs.

Assume you pay \$350 for a dehumidifier with an EF of 1.2. You use it 80 days a year for five years. It removes an average of 20 L (4.4 gal.) every day—a total of 1,600 L (617.8 gal.). Your cost is \$177 a year. A more efficient unit, with an EF of 2.4, costs \$500. The yearly cost is \$153—\$24 less than the EF 1.2 dehumidifier.

Dehumidifier EF	1.2	2.4
Purchase price	\$350	\$500
Days used a year	80	80
Litres removed a day	20 L	20 L
Electrical cost per year	\$107	\$53
Purchase price, averaged over 5 years	\$70	\$100
Total cost per year	\$177	\$153
Annual difference \$24		

Choosing a dehumidifier

When you choose a dehumidifier, make sure you know:

1. The size you need for your house—most manufacturers have sizing charts.
2. Purchase cost.
3. The EF.
4. Whether you have to empty the condensate tub or the unit is self-draining. A self-draining dehumidifier is best, because you don't have to remember to empty the tub every day.
5. Whether it has an automatic defrost feature—it should have one.
6. The noise level at low and high speed.
7. The manufacturer's reputation for quality and guarantees.
8. The service available from the seller or a local service depot.

Placing your dehumidifier

If you have forced-air heating and central cooling and the fan moves the air continuously, it doesn't really matter where you place the dehumidifier.

It will remove roughly the same amount of moisture from the house no matter where you place it.

The most convenient spot is usually the laundry room, on a shelf over the laundry sink so condensate drains directly into the sink. There are two reasons for placing your dehumidifier in your laundry room: it can be warm, and dehumidifiers are more efficient in warm air, and there's a convenient drain.

If your basement is cool use a self-draining dehumidifier and put it where it can drain.

If you have hydronic or baseboard heating, place the dehumidifier where you have the worst dampness problem, as long as that location is not cold. If you have automatic defrost, a cool location is okay.

Placing a dehumidifier in a bedroom may not be a good idea. The unit may be too noisy and you have to empty the condensate tub every day.

Maintenance and operating tips

Clean the internal filters frequently. Start by cleaning them every two weeks. If the filters are not very dirty you can clean them less often.

Vacuum the coils every spring and fall if they get dirty.

You can't set and forget the controls on a dehumidifier. In the muggy days of summer, set the controls to remove more moisture. Lower the setting to remove less moisture in spring, fall and on clear, dry summer days.

When a dehumidifier doesn't solve the problem

A dehumidifier alone may not solve severe moisture problems in your house. Your first course of action is to find the moisture source. Take steps to reduce the amount coming into your house—or to stop it completely. Remember: a dehumidifier is useful—but it isn't magic.

Other useful information from Canada Mortgage and Housing Corporation

Investigating, Diagnosing and Treating Your Damp Basement \$9.95, (order #61065)

Moisture and Air: Problems and Remedies Free (order #61033)

Clean-up Procedures for Mold in Houses \$3.95, (order #61091)

About Your House—Measuring Humidity Free (order #62027)

About Your House—Fighting Mold Free (order #60516)

To find more *About Your House* fact sheets plus a wide variety of information products, visit our Web site at www.cmhc-schl.gc.ca

or contact:

Your local CMHC office

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